REMARKS

This amendment is responsive to the Office Action mailed February 16, 2010. In the application, Claims 1-13 are pending. Claims 1, 3, 5, and 8 are amended herewith. Claim 2 has been canceled without prejudice. Claims 1 and 3-13 thus remain pending in the application. Applicants respectfully request reconsideration of the application in view of the foregoing amendments and the following remarks.

Examiner Interview

Prior to discussing the patentability of the claims, applicant thanks Examiner Ahmed for the time and consideration he extended in a telephone interview conducted on May 13, 2010. Participating in the interview were the undersigned counsel and Anthony M. Lambert, counsel for the applicants. The interview focused primarily on Claim 1 and the features of the claim that distinguish over the cited Grover and Zimmel references. Although no agreement was reached, consideration was given to possible amendments that would advance the prosecution of the application. Applicants were invited to submit a formal response for further review and consideration.

Objection to the Drawings

The Examiner has requested that the method step: "selecting a set of candidate cycles for forming into pre-configured cycles before determining an allocation of working paths and spare capacity in the mesh telecommunications network, the set of candidate cycles comprising a ranked sub-set of the multiple cycles" be shown in the drawings. However, drawings are only required where they are necessary to understand the invention. See 37 C.F.R. § 1.81(a). In the instant case, depicting the method step in a drawing would not further advance the understanding of the claimed invention. The present application is not a mechanical invention in which a view of a machine might help an understanding of how the machine works. Accordingly, it is

respectfully submitted that a drawing showing this method step is not required. Withdrawal of the objection to the drawings is respectfully requested.

Claim Amendments

Claim 1 has been amended to require that the set of candidate cycles is pre-selected based on one or more selection criteria. The requirement that the candidate cycles be ranked has been deleted. The claim has also been amended to require that the determination of an allocation of working paths and spare capacity be a determination of a joint allocation of working paths and spare capacity.

Claim 2 has been canceled without prejudice in view of the amendment to Claim 1.

Claims 3 and 5 have been amended for clarity.

The dependency of Claim 8 has been amended due to the cancellation of Claim 2.

Claim Rejections

In the Office Action, Claims 1–4, 6–10, and 12–13 were rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Grover (U.S. Patent No. 6,421,349) and Zimmel et al. (U.S. Publication No. 2003/0055918). Applicants respectfully traverse this rejection.

This rejection was the subject of an interview with the Examiner on May 13, 2010. Counsel for the applicant pointed out that Grover and Zimmel et al. were patentably different from the invention claimed in Claim 1. The Examiner disagreed on this point but agreed that a modification to Claim 3 might be allowable. Claim 3 is modified in this response in a manner that the undersigned counsel understands that the Examiner would accept. Nonetheless, applicants consider that Claim 1 as amended herewith is in allowable condition and accordingly have set out arguments below explaining why it is allowable.

Claim 1 has been amended to recite:

> A method of providing a mesh telecommunications network with spare capacity arranged in pre-configured cycles, where the mesh

LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

telecommunications network includes multiple cycles that may be potentially configured to provide restoration paths, the method comprising the steps of:

pre-selecting a set of candidate cycles for forming into pre-configured cycles before determining a joint allocation of working paths and spare capacity in the mesh telecommunications network, the set of candidate cycles comprising a sub-set of the multiple cycles selected based on one or more selection criteria;

determining a joint allocation of working paths and spare capacity in the mesh telecommunications network based on the set of candidate cycles; and

providing the mesh telecommunications network with spare capacity arranged in pre-configured cycles according to the allocation determined in the preceding step.

Grover

Turning to the cited art, it is important to understand that Grover describes two different ways (IP-1 and IP-2) to connect the spare capacity in cycles.

In IP-1, the working capacity and spare capacity configuration is a given. See, for example, Col. 8, line 30 ("the network spare capacity is already given, the following formulation optimizes the PC design within the given set of existing spares"). See also the general discussion at Col. 8, line 27, to Col. 9, line 8, of Grover, where the working links and spare links are taken as fixed. IP-1 finds a connection of spare links that optimizes the configuration of protection cycles.

In IP-2, while the spare capacity is permitted to be determined in the pre-configuration pattern, the working capacity is fixed in the same manner as in IP-1 [?]. Hence, in either case of IP-1 or IP-2, there is no "determining a joint allocation of working paths and spare capacity in the mesh telecommunications network based on the set of candidate cycles" as claimed in amended Claim 1.

LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

As noted in the instant disclosure at paragraph 2 of the specification as filed, these formulations generate "large problem files that can be difficult to solve optimally . . . especially . . . when the jointly optimized problem is attempted." Accordingly, Grover proposes a non-optimal heuristic to find suitable pre-configured cycles of spare capacity.

The non-optimal heuristic in Grover is a distributed algorithm (DCPC) for finding a set of pre-configured cycles. In the DCPC algorithm, discussed in some detail at Col. 10, line 66 and following, the working and spare capacity is a given. There is no "joint allocation of working paths and spare capacity in the mesh telecommunications network based on the set of candidate cycles," as claimed in Claim 1. Rather, in DCPC, a statelet traverses a network from node to node, acquiring, as it goes, information on the network (e.g. Col. 12, lines 35–55), until it reaches the originating node it started from (Col. 13, lines 22–32), whereupon the information gained by the statelet as it traverses the network, and other statelets arriving at the originating node, is used to establish a restoration path or pre-configured cycle (Col. 13, lines 32–42). Notably, therefore, the DCPC algorithm takes a given set of working links and spare links and finds cycles within those existing links. The design is a heuristic and is not optimum (Col. 11, lines 4–9).

In contrast, in Claim 1 of the present application, the candidate cycles are found first ("pre-selecting a set of candidate cycles for forming into pre-configured cycles before determining a joint allocation of working paths and spare capacity in the mesh telecommunications network") and then working capacity and spare capacity is allocated based on those candidate cycles ("determining a joint allocation of working paths and spare capacity in the mesh telecommunications network based on the set of candidate cycles"). By pre-selecting the candidate cycles before allocating working and spare capacity, optimization of the routing may be more readily achieved (see, e.g., the present disclosure at the end of paragraph 2), thus

LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS^PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

allowing re-optimization of p-cycle networks in service (see present disclosure as filed, paragraph 9, line 3). Various methods may be used to select the candidate cycles.

In Grover, there is neither pre-selection of candidate cycles before determining a joint allocation of working paths and spare capacity, nor determining a joint allocation of working paths and spare capacity to those cycles, nor does Grover teach or suggest such an approach. The Examiner has noted that Grover does not disclose selection of candidate cycles before allocation of working paths and spare capacity in the parts of Grover that the Examiner previously quoted. However, the Examiner has maintained that Grover teaches, in Col. 21, line 55, to Col. 23 line 44, performing simulation for selecting of candidate cycles for forming into pre-configured cycles before allocating working paths and spare capacity.

Claim 1 has been amended to require pre-selecting a set of candidate cycles for forming into pre-configured cycles before determining a joint allocation of working paths and spare capacity, rather than actual provision of the working paths and spare capacity in a physical network. Col. 21, line 55, to Col. 23, line 44, of Grover discloses a simulated implementation of the method previously disclosed in Grover. The simulated network is simulated to already have spare capacity and the cycles found by the method are formed within the spare capacity already present in the simulated network (see Col. 22, line 50). In other words, the method was applied to a simulated network with an original sparing plan chosen before the method was applied (Col. 23, line 7), or to a simulated network with a modified sparing plan selected by the IP-2 method before the method of selecting candidate cycles was applied (Col. 23, line 1).

Nowhere does Grover disclose or suggest applying the DCPC method of selecting cycles to a simulated or real network with the working paths or spare capacity not already fixed, nor does Grover disclose or suggest applying the IP-2 method to a simulated or real network without the working paths already fixed. Thus, Grover does not disclose pre-selecting a set of candidate

LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

cycles for forming into pre-configured cycles before determining a joint allocation of working paths and spare capacity as the allocation of working paths and spare capacity is already determined when candidate cycles are selected.

The Examiner has argued that it would be obvious to simulate a network before allocating working paths and spare capacity in order to simulate the projected consequences of multiple design options in the real world. Even if this were true, which applicants do not concede, it would not be obvious to simulate different allocations of working paths, as the general tendency would be to select working paths first, ignoring considerations of sparing, and then to designing sparing to protect the working paths.

If a person of ordinary skill in the art were to simulate a network according to the teachings of Grover, before determining an allocation of working paths and spare capacity, they would follow the teachings of Col. 21, line 55, to Col. 23, line 44, of Grover in which it is taught to apply the DCPC method to select candidate cycles to a simulated network already simulated as having fixed working paths and spare capacity. The person of ordinary skill in the art would then apply to the real network the working paths and spare capacity of the simulated network, and the results of the DCPC method on the simulated network.

As can be seen, there is no teaching or suggestion in Grover as to allocating working paths in the mesh telecommunications network based on a set of candidate cycles or any benefits to be gained there from, and so the person of ordinary skill in the art would be unaware of any potential to gain from modifying the working paths to take advantage of the arrangement of spare capacity. Therefore, the person of ordinary skill in the art would have no motivation to simulate different allocations of working capacity. Thus, the allocation of working capacity would be determined before the selection of candidate cycles.

LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

The Examiner has stated that it would be obvious to simulate multiple possibilities before actually allocating the working and spare capacity. Applicants have argued that there are no teaching or suggestion about benefits to be gained about allocating working paths based on the set of candidate cycles and thus no motivation to simulate different allocations of working capacity. The rationale of the Examiner is set out at the bottom of page 9 and on page 10 of the official action. However, applicants assert that it is not obvious to simulate multiple possibilities before actually allocating the working and spare capacity.

The Examiner is incorrect to state that the approach of the present application would be obvious for this kind of problem. Simulation by just picking through different combinations is almost completely ineffectual. Experience and more advanced network theory teaches us that this kind of problem is almost untouchable in any effective way by simple trial and error "simulations." Indeed, this is the point as to why an insightful algorithm as claimed is required.

Network design and the allocation of spare and working capacity is a heavily combinatorial problem. Many even apparently simple problems in network design such as this are *strongly combinatorial:* the number of possible solutions to test by simulation of that sort can grow as the factorial of the number of demands and paths and cycles etc. Just the number of candidate cycles that exist on a graph grows as O(2^N), and the number of orderings of routing individual working paths to be considered grows as O(N!).

Some combinatorial optimization problems of this general class even grow the number of combinations to be "simulated" as O(2^N!) -- exponential to a factorial power. In other words, it would be easy to demonstrate that within any reasonable sized network, you could spend years with a fast computer randomly simulating different combinations of working path routings and cycles and spare capacity and provably have exhausted only an infinitesimal part of the complete possible solution space. Accordingly, "simulation" of the combinations is not an obvious

LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

approach because it is known by those working on these kinds of near-optimal design problems that simple simulation by computer or by hand is almost completely ineffectual above any reasonable size of problem instance. "Simulation" is not obvious here because it wouldn't work. Network designers would not think of ineffectual solutions as "obvious" solutions because they aren't solutions to the problem at all.

Zimmel

Zimmel discloses selecting a set of cycles for forming into cycles (paragraph 58). The cycles in this set are ranked (paragraph 59). However, the cycles of Zimmel are used to create rings in a conventional network. In the present application, joint allocation of working capacity and spare capacity inherently treats the working capacity and spare capacity as separate variables in the allocation process, while in rings working capacity and spare capacity are always the same value on a specific ring. Hence, in Zimmel there is no joint allocation of working capacity and spare capacity. Zimmel is completely unrelated to the specific problem solved by the invention claimed in Claim 1.

Furthermore, there is no teaching of how the cycles are selected in Zimmel. In fact, the disclosure of Zimmel refers to a different US patent application for a teaching of selecting cycles but the further US patent application does not appear to be available for public inspection. Hence, there is no way to determine if Zimmel's technique teaches "the set of candidate cycles comprising a sub-set of the multiple cycles selected based on one or more selection criteria."

LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

Claims 1 and 3-14 Are Patentable over Grover and Zimmel

A *prima facie* case of obviousness is only shown if the cited references, alone or in combination, teach or suggest each and every element recited in the claim. *In re Bell*, 991 F.2d 781 (Fed. Cir. 1993).

For at least the reasons discussed above, Grover and Zimmel fail to teach or suggest the elements recited in Claim 1. Therefore, Claim 1 is allowable over Grover and Zimmel, and since all other claims are dependent on claim 1, all claims are in patentable condition.

CONCLUSION

Applicants respectfully request reconsideration and allowance of the application at an early date. The Examiner is invited to contact the undersigned counsel should there be any questions.

Respectfully submitted,

CHRISTENSEN O'CONNOR
JOHNSON KINDNESS[PLLC]

Kevan L. Morgan

Kevan L. Morgan
Registration No. 42,015
Direct Dial No. 206.695.1712

KLM:kjb

LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS[PLLC]
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100